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**Malaria risk resulting from urban agriculture: Persisting misconception or urgent need for mitigation?
Combining physical and human geographic approaches in an operational setting
in Dar es Salaam, Tanzania**

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The consequences of rapid urbanization can be seen as syndromes of global change. They pose an enormous challenge for cities all over the world, particularly in developing countries. In Tanzania, the present annual urban growth rate is almost five percent, with Dar es Salaam being by far the largest city of the country. Urban agriculture, *i.e.* agriculture in the city or in periurban areas, is a commonly observed phenomenon in developing countries. It supports livelihoods, improves food security and has positive impacts on urban ecology. Urban agriculture in contemporary Dar es Salaam consists of home gardens, livestock production, community gardens, market-oriented production on public and private open spaces, as well as periurban production, with vegetable production playing the most important role.

Malaria is responsible for more than one million deaths world-wide each year, mainly in sub-Saharan Africa. In areas prone to malaria, urbanization has major implications for the transmission and epidemiology of malaria. Though malaria vector density and the likelihood of malaria transmission is much lower in urban areas compared to periurban and particularly rural areas, malaria transmission in urban and periurban settings remains a significant problem. In Dar es Salaam, over a million malaria cases are reported by the health facilities every year, though malaria is clearly grossly overreported. It is commonly assumed that malaria transmission in Dar es Salaam is particularly closely linked to human agricultural activities, where farmers and mosquitoes share common water resources. However, although there is reasonable evidence from West Africa, no proof exists so far that urban agriculture increases actual malaria transmission and malaria prevalence in urban areas.

Urban agriculture in malaria-affected regions may therefore represent a conflict of interests between various stakeholders in urban development. On the one hand, urban farmers receive support from international, national and local institutions to provide healthy food, maintain green areas and generate

income. On the other hand, the public health sector has a rather sceptical attitude towards urban agriculture. This is mainly referring to livestock keeping, the use of wastewater for irrigation, and associating poorly planned urban agriculture with proliferation of malaria transmission by creating breeding sites for mosquitoes. Hence, the prevailing antagonistic stance between regulations restricting urban agriculture and policies which promote it needs to be addressed so they can be effectively harmonized.

The main objective of this PhD research project is to use a geographical approach to investigate potential correlations between urban agricultural land use and malaria hazard caused by breeding sites of malaria transmitting mosquitoes in Dar es Salaam. It is hypothesised that such a correlation does not exist. By applying the theoretical framework of hazard, resilience, vulnerability and risk, malaria risk related to urban agriculture will be assessed. The methodology comprises both quantitative and qualitative approaches. Detailed participatory mapping in the field, basic remote sensing techniques and the use of Geographical Information Systems (GIS) are combined with social geographic investigations. The latter are exploring the perceived role of urban agriculture in relation to malaria hazard, and possible ways to improve social protection of affected populations on various administrative levels, in the light of fostering resilience to malaria hazard. The research project is fully integrated into the operational "Urban Malaria Control Project" based at the Dar es Salaam City Council, and carried out in close co-operation with the "Ifakara Health Research and Development Centre" in Dar es Salaam in a participatory as well as transdisciplinary manner.